

1

2

3 ORIGINAL AND NEW CLAIMS

4 Claims 1-38 (ORIGINAL) - CANCELLED

5 39. (NEW) A method for operating a pressure filter apparatus for separating a quantity of slurry
6 (124) into slurry solids and slurry liquid to form a substantially dry slurry solids filter cake said
7 apparatus comprising:

8 at least one pressure sealable filtration chamber (120) consisting of continuously mating
9 surfaces of relatively moveable upper and lower plates, means for opening and closing said
10 filtration chamber by relatively moving said upper and lower plates,

11 a filter medium, said medium being disposed between said continuous mating surfaces of
12 said upper and lower plates

13 means for moving said filter medium through said filtration chamber when said filtration
14 chamber is open,

15 a source of slurry (124) coupled with said at least one filtration chamber,

16 at least one source of pressurizable fluid (126,128,130,132) coupled with said at least one
17 filtration chamber,

18 separate valving means (A,B,D,E,F) for controlling entry of said slurry and said fluid into
19 said at least one filtration chamber,

20 means for controlling said separate valving means (80) to uniformly distribute said slurry
21 into said filtration chamber and for introducing said fluid into said filtration chamber when said
22 filtration chamber is closed for separating slurry liquid from said slurry to form said slurry solids
23 cake ,

24 and means for moving said filter medium through said filtration chamber when said filtration

1

2 chamber is open for discharging said slurry solids cake (104) from said apparatus , the
3 improvement characterized by the method steps of;

4 a) closing said upper and lower plates to establish said filtration chamber with said filter
5 medium between said continuously mating surfaces

6 b) uniformly distributing said quantity of slurry (124,B,108) in said at least one filtration
7 chamber (120);

8 c) introducing a hot gas fluid (126,A,108) into said filtration chamber to displace slurry
9 liquids from said slurry and to form said substantially dry filter cake on said filter medium,

10 d) opening said filtration chamber by relatively moving said upper and lower plates,

11 e) then moving said filter medium through said open chamber, and

12 f) discharging (104) said dry filter cake from said filtration chamber on said filter medium.

13 40. (NEW) A method according to claim 39, wherein after uniformly distributing said quantity

14 of slurry in said at least one sealable filtration chamber, said sealable filtration chamber

15 comprising relatively movable upper and lower plates forming said sealable filtration chamber

16 when closed with mating surfaces and movably enclosing a filter medium between said mating

17 surfaces onto which said slurry is distributed, said chamber being pressurizable while said

18 sealable filtration chamber is closed, the method includes the step of

19 forcing a first portion of said slurry liquid from said distributed slurry in said at least one
20 sealable filtration chamber with a first quantity of fluid (D,E,F,108) to initiate formation of a
21 filter cake of slurry solids within said chamber on said filter medium, and

22 while said sealable filtration chamber is closed said hot gas fluid (A,108) is passed through
23 said initially formed filter cake to displace a further portion of said slurry liquid from said filter

1

2 cake and to form said substantially dry filter cake.

3 41. (NEW) The method of claim 40 wherein said hot gas fluid is steam.

4 42. (NEW) The method of claim 41 wherein said steam is dry steam.

5 43. (NEW) The method of claim 40 wherein said hot gas is hot air, hot inert gas or
6 combinations thereof.

7 44. (NEW) The method of claim 40 wherein said hot gas fluid is hot gas or hot air, hot inert gas
8 or steam, or combinations thereof, and is passed through said initially formed filter cake in a
9 sequence of individual selection of hot air, hot inert gas or steam, or combinations thereof, in an
10 order determined by an initial analysis of the slurry to be separated into slurry solids and slurry
11 liquid.

12 45. (NEW) The method of claim 40 wherein said slurry is initially pre-treated with heat from
13 hot air, hot inert gas or steam, or combinations thereof, while being uniformly distributed in said
14 filtration chamber.

15 46. (NEW) The method of claim 40 wherein introducing said first portion of fluid includes
16 using hot wash fluid.

17 47. (NEW) The method of claim 40 wherein said filtration chamber is preheated prior to having
18 said slurry uniformly distributed therein.

19 48. (NEW) The method of claim 47 wherein said filter chamber is pressurized with hot gas,
20 hot inert gas, steam, or combinations thereof, prior to having said slurry uniformly distributed
21 therein.

22 49. (NEW) The method of claim 44 wherein said sequence of passing hot air, hot inert gas or
23 steam, or combinations thereof, through said filter cake is a repeated sequence of selected hot air,

1

2 hot inert gas or steam, or combinations thereof.

3 50. (NEW) The method of claim 39 with the additional step of passing air or gas through said
4 cake after said hot gas to cool said cake prior to discharging said dry filter cake from said
5 filtration chamber.

6 51. (NEW) The method of claim 39 wherein said slurry fluid displaced from said filtration
7 chamber is recirculated into contact with said slurry or hot gas to transfer heat from said slurry
8 fluid to preheat said slurry or hot gas.

9 52. (NEW) The method of claim 39 wherein said hot gas fluid is hot air, hot gas or steam at
10 elevated temperature and pressure within said filtration chamber and when exiting from said
11 chamber.

12 53. (NEW) The method of claim 52 wherein said hot gas fluid is at a temperature of about 80°C
13 to about 230 ° C.

14 54. (NEW) The method of claim 52 wherein said hot gas fluid is at a pressure about -55.16kPA
15 (-8.0psi) to about 2,757.92kPA (400psi).

16 55. (NEW) The method of claim 39 wherein said hot gas fluid is selected by analysis of said
17 slurry to be separated so as to prevent unwanted structural changes in said slurry solids in said
18 filter cake formed in said filtration chamber.

19 56. (NEW) The method of claim 39 wherein means are provided in or associated with said
20 filtration chamber for sensing conditions of temperature, pressure and filter cake formed
21 condition, or combinations thereof, for controlling the distribution of said slurry in said filtration
22 chamber and for controlling the introduction of said hot gas fluid to said filtration chamber.

23 57. (NEW) The method of claim 56 including controlling said distribution of slurry into said

1

2 filtration chamber and said passing of said hot gas fluid in accord with said sensed conditions
3 within said filtration chamber

4 58. (NEW) The method of claim 39 including the step of sealing said filtration chamber prior to
5 distribution of said slurry, and then elevating the pressure in said sealed filtration chamber to a
6 predetermined pressure.

7 59. (NEW) The method of claim 39 wherein said at least one filtration chamber has a plurality
8 of input ports and exit ports for selectively entering said slurry or said hot gas fluid into said
9 filtration chamber and for exiting liquids and hot gas fluid from said filtration chamber.

10 60. (NEW) A pressure filter apparatus for separating a slurry (124) into slurry liquid and slurry
11 solids and for forming a substantially dry slurry solids cake on a filter medium from said slurry
12 characterized by;

13 at least one pressure sealable filtration chamber (120) consisting of continuous mating
14 surfaces of upper and lower plates, means for opening and closing said filtration chamber by
15 relatively moving said upper and lower plates,

16 a filter medium, said medium being disposed between said continuous mating surfaces of
17 said upper and lower plates,

18 means for moving said filter medium through said filtration chamber when said filtration
19 chamber is open,

20 a source of slurry (124) coupled with said at least one filtration chamber,

21 at least one source of pressurizable fluid (126,128,130,132) coupled with said at least one
22 filtration chamber,

23

1

2 separate valving means (A,B,D,E,F) for controlling entry of said slurry and said fluid into
3 said at least one filtration chamber,

4 means for controlling said separate valving means (80) to uniformly distribute said slurry
5 into said filtration chamber and for introducing said fluid into said filtration chamber for
6 separating slurry liquid from said slurry to form said slurry solids cake on said filter medium,
7 and means for controlling movement of said filter medium through said filtration chamber
8 when said filtration chamber is open for discharging said slurry solids cake (104) from said
9 apparatus.

10 61. (NEW) The apparatus of claim 60 wherein said at least one source of fluid coupled to said
11 at least one filtration chamber includes a source of hot gas.

12 62. (NEW) The apparatus of claim 61 wherein said source of hot gas (126) includes hot air, hot
13 inert gas, or steam, or combinations thereof.

14 63. (NEW) The apparatus of claim 61 including a steam source (809) that produces steam at
15 elevated pressure and temperature.

16 64. (NEW) The apparatus of claim 60 wherein said means for controlling said valving means is
17 a programmable controller (80) that can be programmed to pass said at least one source of fluid
18 into said at least one filtration chamber in a desired sequence of any one or all of the following
19 steps:

20 initiating the formation of a filter cake,

21 dewatering said cake,

22 washing said cake,

23

1 changing the temperature of said cake, or

2 discharging said cake from said filter apparatus.

3 65. (NEW) The apparatus of claim 60 wherein said apparatus includes means for coupling said
4 separated slurry liquids with at least one of said sources of slurry or said source of fluid to pretreat
5 said sources prior to entry into said filter apparatus.

6 66. (NEW) The apparatus of claim 64 wherein said programmable controller (80) is
7 programmed to apply hot air, hot inert gas or steam, or combinations thereof, in preprogrammed
8 sequences to produce said substantially dry cake.

9 67. (NEW) The apparatus of claim 60 having a source of compressed air (130, 132), a source of
10 inert gas (130, 132), and a steam source (126) being connected to said apparatus and said source
11 of fluid being coupled with said source of compressed air, source of inert gas and steam source
12 to coordinate pressure, temperature and conditions within said at least one filtration chamber
13 (120) with conditions in said source of compressed air, source of inert gas and steam source.

14 68. (NEW) The apparatus of claim 60 including means for supplying wash fluids (128) to said
15 at least one filtration chamber for treating said substantially dry filter cake.

16 69. (NEW) The apparatus of claim 60 including a filter medium (104) disposed within said at
17 least one filtration chamber (120) for supporting said substantially dry filter cake,
18 means for transporting (115,117) said filter medium through said filtration chamber,
19 and means for cleaning (400, 402) said filter medium.

20 70. (NEW) The apparatus of claim 69 wherein said cleaning means is a driven brush (300)
21 mechanism (402) that contacts said filter medium.

22 71. (NEW) The apparatus of claim 69 wherein said cleaning means includes a source of fluid
23

1 (804) for cleaning and treating said filter medium.

2 72. (NEW) The apparatus of claim 60 including vibrator means (200) connected to said at least
3 one filter chamber for vibrating said chamber during said discharge of said dry cake from said
4 apparatus.

5 73. (NEW) The apparatus of claim 60 wherein said apparatus includes:

6 a plurality of filtration chambers in operating cooperation,

7 said source of slurry coupled to each of said plurality of filtration chambers,

8 said source of fluid coupled to each of said filtration chambers,

9 said separate valving means includes valving means associated with each of said filtration
10 chambers, and

11 said means for moving said filter medium for discharging said dry cake from said filtration
12 chamber is coupled to each of said filtration chambers.

13 74. (NEW) A pressure filter apparatus according to claim 60 wherein said at least one filtration
14 chamber is a dual sided filtration chamber including filter media on both sides of said chamber,

15 said slurry input means is connected to said chamber between said filter media,

16 said at least one source of fluid is coupled to said chamber between said filter media, said
17 source including hot gas, inert gas and steam, or combinations thereof,

18 said apparatus includes a flexible diaphragm in cooperating engagement with said filter
19 media,

20 and fluid means coupled to said flexible diaphragm for squeezing said diaphragm
21 against said filter media for removing liquids from said slurry within said chamber and for
22 forming said substantially dry filter cake.

23